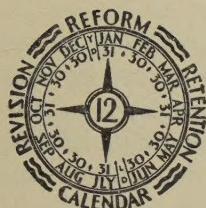


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IN GOVERNMENT ACCOUNTING

By HERBERT H. RAPP

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THOSE who are familiar with the complexity and vital importance of the United States government's vast undertakings in the fields of statistics, finance, budgets and other records, will view with grave attention any proposal for a change in the calendar system on which these tabulations are based.

Government statistics have come to affect every department of our economic life, and any calendar change that would seriously invalidate their accuracy for purposes of comparison and guidance would be purchased at too great a cost to win the approval of the sober-minded accountant or statistician.

From this viewpoint, the proposed 13-month calendar would seem to be ruled out. On the other hand, the suggested 12-month equal-quarter calendar would not incur any penalty, for its changes in comparable periods would generally be no greater than the casual variations which already occur in those periods, due to the varying incidence of the weekdays and other similar defects of the present calendar.

One of the advantages claimed for the 13-month calendar is the elimination from accounting of the proration of weekly data at the close of each month to obtain weekly totals. Under the plan whereby each month consists of four weeks, monthly totals are quickly and easily produced by

a simple addition of the weekly totals. While it is true that this feature of the 13-month calendar appeals superficially to the accountant, its value is far outweighed by several disadvantages inherent in the plan from an accounting standpoint. Chief among these are the difficulties presented in the preparation of quarterly and semi-annual statements, and the practical impossibility of comparing data produced on the new basis with the records of the past.

The World Calendar, with its equalized quarters of 91 days each, is not open to either of these criticisms. In fact, its balanced structure and perpetuity of form will simplify many of the difficult problems of the accountant, particularly those involved in the preparation of financial and operating statements. And it will go a long way toward eliminating certain factors that now complicate comparisons between identical periods in different years.

Quarterly statements are a fixture in present-day business and finance. The quarter is the established basis for government accounting. All federal departments are required to make quarterly statements to the Director of the Budget. Most government offices, like most business organizations, prepare monthly statements for their internal use, and quarterly statements for external or public use.

The regular meetings of the directors of a large majority of all corporations are held quarterly. It is at these meetings that the results of operations for the preceding three months are reviewed, that dividend action is taken, and that plans for the future are outlined. The quarter thus becomes the basic business unit. Any calendar which throws this useful period into the discard will meet with merited resistance from business interests, big and little.

In the federal government, it is hard to imagine any possible substitute for the present system, whereby the Bureau of the Budget requires each of the various bureaus and establishments to apportion its annual appropriation over the four quarters of the fiscal year, and to report periodically the commitments and expenditures against the quarterly apportionments. Many of the federal offices also prepare completely detailed quarterly financial statements for submission to their chief administrative officers and to the Comptroller General of the United States, in connection with the administrative review and final audit of the business transacted during the period. Others of the federal offices prepare such statements monthly and assemble them quarterly.

Income taxes are paid quarterly, and the quarterly period is also of large importance in the control and review of other tax receipts and Treasury business.

Viewed from a more general standpoint, it is worthy of note that the quarters have a definite source and sanction in the fact that they corre-

spond to the four seasons of the year, and in this respect they constitute a basic and important relationship with human life. In this respect the quarters are as fundamental to calendar reckoning as the day and the year. The three units, in fact, exercise a very strong influence upon the living conditions of animals, plants and human beings, and therefore have been natural units in practically all calendars since primitive man first began to search for a method of measuring the passage of time. Applying this teaching to modern business affairs, it will be observed that the seasons of the year have a direct bearing on the volume of business transacted by many concerns. It therefore becomes highly desirable that any revision of the calendar shall provide for the retention of the seasonal divisions. This The World Calendar does, in a manner which improves obviously on the present quarters by equalizing their length, and—equally important—by arranging that the first day of each quarter shall fall on the first day of the week, and that the last day of each quarter shall fall on the last day of the week, thereby simplifying the closing of accounts and records for each quarter and avoiding the present necessity of prorating weekly items. This permanent stabilization of the weekday incidence of the beginning and end of each quarter will greatly simplify such matters as the taking of inventories, which will henceforward fall invariably at the most convenient time.

Calendar errors in the comparison of business and government statistics at present are due to variations in the length of months and quarters, and to the varying arrangement of weekdays in the compared periods. The first of these two kinds of errors is remedied by the proposed rectification of the lengths of months and quarters; the second is remedied by making the calendar perpetual and invariable through the use of the Year Day, placed at the end of December. Neither of these errors requires any such revolutionary and upsetting remedy as a 13-month calendar.

Specific examples of calendar errors in existing government statistics may be found in practically every federal department. Studies along this line might well be undertaken, for example, in the important tabulations of employment and industrial turnover collected by the Department of Labor; in the statistics of domestic and foreign trade kept by the Department of Commerce; in the records of customs receipts and internal revenue collections, of disbursements by government disbursing officers, recorded by the Treasury Department; in the figures of estimated and actual expenditures and revenues gathered by the Bureau of the Budget; and in the statistics of passports and citizenship kept by the State Department. In many of these records, large calendrial errors could no doubt be shown, with results perhaps as surprising as those revealed by the recent experimental studies conducted in Germany under Dr. Platzer, head of the statistical bureau of the German government.

Such studies would certainly point emphatically to the need for and economic value of a conservative revision of the present calendar. The evidence, I think, would be overwhelming that all the necessary values of correction would be obtained through the adoption of the changes suggested by advocates of the 12-month equal-quarter calendar, with no need for recourse to drastic experimentation involved in 13-month revision.

In the very important matter of retaining the values represented by the vast store of records and statistics of past years, so that these will always be readily available for comparison, every user of statistics will instantly admit the overwhelming advantages which The World Calendar possesses over the 13-month proposal. With The World Calendar, no adjustments will be necessary, because the changes in the present calendar are so slight. Files of accounting and statistical data consist for the most part of compilations prepared on a monthly and quarterly basis. Comparison of such data with material prepared on the basis of a 13-month year would require recomputations on an enormous scale, the cost of which in many cases would be prohibitive, while in other cases the adjustment would be a physical impossibility. A large mass of existing statistical information would, in fact, have to be discarded completely, and a new start made.

There is another important consideration in connection with any calendar change. Will the new calendar bring permanent economies or will it involve lasting increases in bookkeeping and statistical expense? In government records, the addition of a new month to the year would obviously cost something, as operations that are now done 12 times a year would have to be done 13 times. No such increase in costs would be involved in the proposed 12-month revision.

The perpetual feature of the new calendar will be a tremendous boon to every business that makes comparisons with previous periods. The number of Sundays and of each of the weekdays forming each month will be fixed and will remain constant, year in and year out. Allowances will no longer have to be made, as is the present necessity, for these very annoying variations. A merchant will not have to explain that January of this year is not exactly comparable with January of last year, since last year the month contained five Saturdays and this year it had only four.

In government accounting and statistics, which is the special subject under discussion in this article, The World Calendar will simplify the preparation of quarterly accounts and statements, which form an integral part of present-day records and which should be retained. It will improve the comparability and value of all monthly and quarterly records. And it will permit the continued use of the great mass of comparable past data, without recomputation or adjustment, at the same time eliminating certain factors of error that have hitherto complicated comparisons between similar periods in different years.

CHAMBER OF COMMERCE VIEWS

By M. H. DESLANDRES

Member of the 1921 Commission on Calendar Reform of the International Chamber of Commerce

Adoption of a plan similar to that known in America as The World Calendar has been recommended by several international congresses of Chambers of Commerce, says Professor Deslandres in this article, taken from the official report of the 1921 Commission of the International Chamber of Commerce. Professor Deslandres' associates on the Commission were Armand Baar of Belgium, Alexander Philip of England, G. N. de Stoppelaar of Holland, Professor G. Bigourdan of France, and F. P. Keppel of the United States. M. Armand Baar later appeared before the meeting of the International Astronomical Union as the representative of the International Chamber of Commerce, speaking for the retention of the 12-month system, in any plan for calendar reform. Resolutions in favor of calendar reform were also adopted by the International Chamber of Commerce congresses in 1921, 1923, 1925 and 1929.

CALENDAR reform is a problem which has occupied the minds of men from the earliest times, but the solutions which have been applied hitherto do not seem in several respects to be the best possible. The Gregorian calendar is better than any of its predecessors; that is why it is at present the most widely used. Its chief advantage is that the ordinary year is as near as possible to the solar year and the rules which bring about this result are simply and easily applied.

But on other points it is not satisfactory. During recent years, the imperfections of this calendar have been pointed out and discussed, and proposals for corresponding improvements have been made which have often been most interesting.

The principal objections raised are as follows:

Granted that the year has the right number of days and fractions of a day, the way in which the days and weeks are arranged in the months and in the year is neither the simplest, most logical, nor the most convenient. The half-years, quarters and months are more variable than is necessary, and the week which overlaps from one year to another brings about variations in the calendar which give rise to unnecessary difficulties. The quarters do not coincide perfectly with the seasons, and the changing date of Easter causes complications.

Most of these objections are due to the very origin of the Julian calendar and to the measures taken in order to connect it with previous calendars. As is usual in such cases a compromise was made between the old customs and the new requirements.

In this way the months from September to December have kept their

names, although the order in which they come has been changed. The months of July and August, consecrated to Caesar and Augustus, have been given a length of 31 days, whereas the month of February has only 28 days in three years out of four. January 1 has been chosen as the first day of the year simply because it coincided at that time with the entry into office of the consuls.

There is no longer any reason for these anomalies, and it is surprising that they have been kept so long.

The week gives rise to special complications. It is not included a fixed number of times in the year, and consequently the same week does not always occur on the same date in different years. The year includes 52 complete weeks, plus one or two days, according to whether the year is an ordinary one or a leap year.

These 52 weeks can be split up into two equal half-years of 182 days each, and four quarters of 91 days each, each quarter containing 13 weeks or one month of 31 days and two months of 30 days.

If, then, the extra days are set aside, there are always four identical quarters with the same day of the week occurring on the same day of the month. The calendar in this way becomes invariable, and consequently much simpler and much more convenient.

This scheme has already been examined and recommended in the competition which was organized in 1887 by the Astronomical Society of France for the selection of the best calendar. Several writers studied it after this date and suggested slight modifications. It was laid before the International Association of Academies in 1913, and its adoption has been recommended by several international congresses of Chambers of Commerce.

The question of calendar reform, then, has already been examined from every point of view, and seems to be ripe for a definite solution. Among the bodies concerned, the most important and the most interested in real progress, is that of business men and industrialists. Simplification and unification of the calendar would be of great advantage to them, and it is their special duty to take the initiative and lead the way.

A close international agreement has already been arrived at to regulate and render uniform the measure of time. Greenwich time has been adopted as the universal time, and the entire globe has been divided into 24 horary parts. The result is that there is now order and harmony where once there was great confusion.

All that remains is to group the days and weeks in the year in the most logical, simplest and most convenient manner. The calendar so constituted, having become universal, will make the international rule complete as regards the measurement of time, and will insure for all men an economy of effort and thought.

CALENDARS OF ISRAEL

By JULIAN MORGESTERN

President, Hebrew Union College, Cincinnati

In response to many inquiries from readers regarding the various calendars employed by the Jews during Biblical times and more recently, we are publishing this brief abstract of the researches made by one of the leading world authorities on the subject of the Jewish calendar. A fuller treatment of the subject will be found in a scholarly essay in the Hebrew Union College Annual for 1924.

THE BIBLE furnishes ample evidence that, at different periods in ancient Israel, three different festival calendars and calendar systems were employed. The first of these may well be called the Canaanite Calendar and for convenience may be designated as Calendar I. The second calendar, which will be labeled Calendar II, is characterized by the fact that it refers to the months by number instead of by name, and so speaks of the first month, the second month, and the like. The third calendar used the Babylonian names of the month. It may be referred to as Calendar III.

It is generally taken for granted, without any question at all being raised, that these three calendars were identical in all essential respects, and that all that took place when Calendar II superseded Calendar I was that the numbers of the months were substituted for the old Canaanite names, and that similarly, when Calendar III superseded Calendar II, the newly borrowed Babylonian names of the months supplanted the older month numbers. Particularly with regard to the transition from Calendar II to Calendar III is this simple and non-significant process generally assumed. The Talmud records the tradition that the exiles, returning from Babylonian captivity, brought back with them and introduced into Palestinian practice the Babylonian month names. Were this tradition historically correct it would indicate that the use of the Babylonian names of the months began very soon after the exiles began to return from Babylon, near the beginning of the post-exilic period. However, such is not the case, and therefore the tradition attests no more than that the rabbis of the Talmud were fully aware that the names of the months which are still used in the Jewish calendar were borrowed from the Babylonian calendar.

Certainly, it does not follow necessarily that the three calendars agreed in all essential respects, except in the manner by which they indicated the month. In fact, common sense suggests that if all that took place was merely a change from calling the months by their old Canaanite names, to a new-fangled system of indicating them by number, and then some time

later, a substitution of a new set of month names borrowed from the Babylonian calendar, for the former designation by number, there would have been no need of any change, and the old Canaanite month names could have continued to function with complete satisfaction down to this very day; for, surely, between names of Canaanite origin and names of Babylonian origin ancient Israel could have had little preference. This consideration suggests the probability that these two changes of the manner of designating the months in ancient Israel may have been due to causes of considerable importance, and may have been accompanied by internal revision of the entire calendar system of more than passing significance.

For example, it may well be that not only did the months in the three calendars differ in names, but they may also have differed in far more essential matters. We do know that the months of Calendar III are lunar in character, as is the year also. But the months of either or of both of the other two calendars may have been solar, and in such case, the year as well. And in such case both months and years of either or both Calendars I and II would have been of different lengths than the months and years of Calendar III. They would have begun and ended at different moments, and would undoubtedly have employed different systems of intercalation. And not impossibly, also, the festivals and other like institutions may have come at different relative moments in the respective calendars. Nor does it follow that Calendar II must have agreed in all essential details except in the manner of designating months, with either Calendars I or III.

In other words, the most probable hypothesis is that the existence of these three systems of designating the months in the Bible implies that there were three different calendars employed at different times in ancient Israel, and that the transition from the one system of designating months to the second system, and from this in turn to a third system, implied two revisions of the calendar, each in all likelihood of a thorough-going nature.

The results of investigation can be easily summarized, and a bird's-eye view of the history of the calendar in ancient Israel gained thereby.

When the tribes of Israel entered the land of Canaan and settled down to an agricultural life, among the many elements of the Canaanite agricultural civilization which they borrowed were the Canaanite calendar and the Canaanite agricultural festivals. This calendar was apparently in vogue not only among the Canaanites, but among the Phoenicians, and probably among other neighboring, kindred peoples as well. It was a purely solar calendar, consisting in all likelihood of 365 days, divided into 12 months of 30 days each, with five intercalary days inserted at appropriate moments, probably during the summer half of the year.

This calendar took direct cognizance of the two equinoxes. It celebrated the New Year's Day at the fall equinox, and reckoned the year

from that moment. It celebrated two important cognate festivals on the seven days immediately preceding the two equinoctial days. And apparently the day of the spring equinox marked the beginning of the season of the grain harvest, when the first sheaf of the new grain was cut and sacrificed with proper solemn ceremony.

This calendar continued to be used in Israel, with little or no modification that can be noticed, until shortly before the Babylonian exile. Then, at some time between 608 and 586 B.C., an altogether new calendar was introduced. This calendar was apparently based upon a Babylonian model, and its adoption was undoubtedly due to the dominant Babylonian cultural influence of the period. It was a luni-solar calendar of 354 days, probably divided into 12 months of alternately 30 and 29 days each, and it probably had a rather loose system of intercalation, consisting of the occasional insertion of an extra month of 29 or 30 days at whatever time and whatever moment of the year the authorities might deem proper.

Beginnings of the months of this calendar were not, of course, coincident with the beginnings of the months of Calendar I. The names of the months of the old Canaanite calendar were discarded entirely, and the months of Calendar II were indicated by number instead of by name. But the solar agricultural festivals of the old calendar continued to be observed in the ancient manner and at relatively the same critical moments of the agricultural year.

This calendar continued to be employed in Israel for approximately three centuries, certainly until some time after Ezra and Nehemiah, and in all probability down until the beginning of the Greek period at the end of the 4th Century B.C.

Shortly before that time, however, but likewise later than the time of Ezra and Nehemiah, the dates of the festivals began to be shifted, and the manner of their celebration greatly modified. New Year's Day was transferred from the 10th of the seventh month, the day of the fall equinox of Calendar I, adapted to Calendar II, to the first of the seventh month, the new moon day, and the Sukkot festival to the 15th through the 21st of that month. At the same time the Passover festival was transferred from the first eight days of the first month to the 15th through the 21st. Both the Sukkot and the Passover festivals now began on the full moon day of the first and seventh months respectively, exactly six months apart, and obviously bore a reciprocal relationship to each other.

Some time later an eighth day was added to the seven days of the Sukkot festival. This was undoubtedly the result of the persistent recollection that originally there had actually been eight days of celebration at the time of the Sukkot festival. This additional eighth day was called by a rather colorless title and the manner of observance was purely artificial and formal. It was observed on the 22d of the seventh month. But the

memory survived in the folk-practice of Israel that the tenth of the seventh month had been from of old a day of marked sacredness and peculiar observance. A few of the ancient peculiar ceremonies of the day, such as the sending out of the goat to Azazel and the dances of the maidens in the vineyards, had continued to be observed almost without interruption. Eventually the priests, forced it would seem by popular demand, legitimized again the religious observance of the day. They relegated some of the old rites that still survived, to a secondary position, developed a highly complex ritual of sacrifice, purification and priestly functioning, and thus called into being Yom Kippur, the Day of Atonement, as the most sacred day of the entire Jewish religious year.

Probably at about the same time, or shortly before, the institution of the "second Passover" from the 15th through the 21st of the second month was inaugurated. The festival calendar of Judaism was thus practically completed.

Shortly after the beginning of the Greek period, near the end of the 4th century B.C., a new calendar was introduced. It differed from Calendar II primarily only in that it employed the Babylonian names of the month for the old system of indicating the months by numbers, and in that it seems to have had a far more exact system of intercalation. This made it possible among other things to fix the dates of the festivals, the Sabbaths, and other similar religious occasions with exact precision, something which, apparently, the growing ritualism of the time demanded.

Calendar III supplanted Calendar II only very slowly and gradually, and did not come into universal use, it would seem, until, at the very earliest, about the beginning of the Christian era, or perhaps even a little later than that, but certainly before the destruction of the Temple by the Romans in 70 A.D. From that time on it has been the official religious calendar of Judaism.

Such in brief, is the history of the calendar in ancient Israel.

SEASONAL VARIATIONS

By Wilbert G. Fritz, Instructor in Financial Research, University of Pittsburgh

AS A research worker, I have encountered endless difficulties from the constant shifting of days and periods in our archaic calendar. Some of the most striking difficulties are found in the monthly indexes, but even more serious ones occur in the weekly indexes.

Department store sales, for example, rise to great heights before Christmas Day and drop to unusually low levels thereafter. Imagine the difficulties of measuring seasonal variation when, as this year, there are six full shopping days in the week before Christmas Day and none in the same week after Christmas Day, whereas last year there were four shopping days before and one after.

I am much opposed to the present calendar, which has been devised arbitrarily and handed down to us by custom. The chief advantage of a 12-month revised calendar over a 13-month plan is its divisibility, an end greatly to be desired. It has the merit of symmetry, fixity and divisibility.

ITALIAN VIEWPOINTS

By AMEDEO GIANNINI

Chairman of the Italian Committee for Calendar Reform; Professor in the University of Rome; Counsellor of State and Minister Plenipotentiary in the Italian Ministry of Foreign Affairs; Representative of the Italian National Research Council; Delegate to the Assembly of the League of Nations; Italian representative in the International Conference on Unification of Financial Law, the European Conference on Highways, the Conference on International Law; Secretary-General of the Council of Diplomatic Law.

SINCE 1900 there has been throughout the world a lively and active movement for reform of the calendar. In some quarters emphasis has been laid on the stabilization of Easter and the other movable religious feasts. In other quarters more importance has been attached to the complete reform or simplification of the calendar.

The proposals for reform have been the subject of debate and consideration at numerous international meetings of various kinds, such as the Congress of the International Chamber of Commerce, the meetings of the International Astronomical Union, and the conferences of evangelical churches. Studies of calendar irregularities have also been made under a variety of auspices.

Particular importance is attached to calendar reform by business and economic organizations, especially in England and the United States. In both these countries an intensive propaganda has been carried on among all classes of the public through specially organized committees and associations, which have prepared and circulated a great number of booklets, pamphlets and circulars. Their methods of demonstrating the necessity for calendar reform have embraced all those means of popular persuasion which are so peculiarly the property of the Anglo-Saxon peoples. In America a special review has been started, devoted exclusively to the discussion of calendar problems, under the title *The Journal of Calendar Reform*. There is also an international league in which Americans predominate but which seeks adherents throughout the world to advance this cause.

The promotion of calendar reform has increased considerably since the war; that is, almost ironically, at the very time when the Gregorian calendar has been at last accepted by the countries of the Greek Orthodox Church and by some of the Mohammedan nations.

In this connection it will be noted that among the many calendar systems used by various peoples at different times, only three have remained in current civil use until recent times, namely the Julian, Gregorian and Mohammedan. The Gregorian reform of 1582, attributed to a Pope, was not intended to supplant the Catholic ecclesiastical calendar, which did

not in fact coincide with the solar year. It only attempted to reconcile a few discrepancies, mainly seasonal and astronomical. It was immediately accepted by the Catholic nations, and later adopted by certain Protestant countries—Holland, Germany, Switzerland (1701), England and America (1752), Sweden (1753). It was not accepted by the nations of the Greek Orthodox Church (Bulgaria, Greece, Roumania, Jugo-Slavia, Russia) until after the World War. Even more recently certain Mohammedan countries, such as Turkey and Egypt, have given it their adherence, supplanting for civil use the old Moslem calendar.

The advantage of a single calendar for all nations is so evident that all objections to the Gregorian plan have been gradually overcome, and it is now in use throughout the greater part of the civilized world. Nevertheless, the Gregorian calendar is not perfect; it has certain obvious inefficiencies.

Outside of England and America, however, the movement for calendar reform has not yet assumed the proportions which it has attained in those countries, except with certain special business and economic interests. As far as Italy is concerned, even those special interests have remained outside this movement.

One of the early results of the movement, however, was that the League of Nations Commission on Communications and Transit decided nearly ten years ago to consider the problem, in the belief that the reform would be of assistance to economic and social life, particularly in world transportation. In 1923 the Commission formed a special committee to investigate and study calendar problems, and this action was communicated to governments and religious authorities with a request for their cooperation. Questionnaires were sent out to a large number of international organizations, and the responses were submitted and considered by the special committee.

At the conclusion of three years' work, this committee did not feel that it had sufficient grounds for any definite pronouncements on calendar reform, mainly because the governments had not been able to obtain any considerable reaction from the public, beyond the opinions of certain technical, academic and economic experts and organizations. It suggested, therefore, that in every country a national committee should be organized to canvass public opinion and to report results from time to time.

In 1927 the International Chamber of Commerce voted independently a resolution urging that the League of Nations call a formal international conference on calendar reform, with power to present official recommendations. The League, mindful of the work which had already been done by its Commission on Communications and Transit, responded by making calendar reform the main subject for consideration at the Fourth General Conference on Communications and Transit, in 1931, to which all important nations would send official delegates.

For the purpose of preparing this program and providing the essential material for deliberation and discussion, a preliminary meeting was held at Geneva in June, 1931. Three months later the General Conference met and dealt with calendar reform in sessions lasting over a week, with delegates from 44 countries participating.

The deliberations fell into two parts, the first dealing with proposals for the stabilization of Easter, the second with plans for general calendar reform.

In the matter of a fixed Easter, the delegates were faced with a homogeneous and unanimous opinion. It appeared that the stabilization of Easter would meet with the approval of all groups, even of the religious authorities. The Holy See, in a letter under date of March 7, 1924, from the Apostolic nuncio at Berne, had made it known that the stabilization of Easter would not involve any dogmatic difficulties, even though it meant the abandonment of traditions sanctioned by past Ecumenical Councils. If the general good required this change, the Catholic Church would not be an obstacle, although it would wish first to obtain the vote of an Ecumenical Council. The non-Roman churches with practical unanimity declared their willingness to accept the reform.

Furthermore, the English government in 1928 had passed an act definitely fixing Easter for the first Sunday after the second Saturday in April, with a proviso that the law was to go into effect only upon the adoption of similar legislation by other nations. After passage of this law, the British government had requested other countries for their opinion of the plan, but the replies were all non-committal, these other countries desiring to await further study and action by the League of Nations or by the Catholic Church. Most governments replied that action by them was impossible unless first accepted by the churches; otherwise they would run the risk that the people would ignore the civil date prescribed for Easter and continue to observe that fixed by the religious authorities. Thus the initial step taken by Great Britain seems to have been a bit hasty, and up to the present time it has not obtained the desired result. It did, however, influence and guide in the passage of the so-called "Easter Act" of the League of Nations at the conference in Geneva in October, 1931.

In regard to general calendar reform, the League Commission in 1931 did not reach any complete conclusions. More than 160 projects for revision of the present calendar were discussed and sifted. The advantages and disadvantages of each of the principal projects were presented and considered. Finally the Commission rejected all but two proposals—the perpetual 13-month plan, and the perpetual 12-month equal-quarter plan, known in America as The World Calendar. These two plans were referred back to the governments for further study and consideration.

Italy has, therefore, appointed a national committee on the subject and

has sought the opinion of the principal academies of the kingdom, such as the Lincei Academy, the Royal Lombard Institute, the Royal Venetian Institute and the Royal Academy of Sciences at Turin.

The most significant of the reports received from these institutions were those of the Lincei Academy and the Academy of Sciences, which definitely recommended the stabilization of Easter but reached no conclusion as to the possibility or desirability of a perpetual calendar.

The Italian National Committee, which was appointed by the government on the nomination of the National Council for Research, contains representatives from business, manufacturing, agriculture, science, finance, transport, politics and religion. Its members are Luigi Biamonti, Director of the Legal Bureau of the General Fascist Confederation of Italian Industry; Corrado Marchi, National Fascist Confederation of Land Transport and Internal Navigation; Mario Zamboni, National Fascist Confederation of Maritime and Aerial Transport Enterprises; Dr. Adolfo Nesi, General Fascist Banking Confederation; Antonio Navarra, National Fascist Confederation of Merchants; Prof. Mgr. Antonio Pellizzola, ecclesiastical counsel of the Royal Embassy of Italy to the Vatican; Commander Mario Barenghi, National Director of Social Aid; Prof. Giuseppe Tassinari, Royal Superior Institute of Agriculture at Bologna; Prof. Filippo Angeletti, Director of the Royal Astronomical Observatory at Palermo; Prof. Giuseppe Armellini, Director of the Royal Astronomical Observatory of Campidoglio, Rome; Prof. Carlo Alfonso Nallino; Gian Battista Toffolo, Royal Vice Consul, *Secretary*; Prof. Amedeo Giannini, *Chairman*.

Conclusions of the Italian committee, up to the present time, have been limited to three statements: first, that the time is not yet ripe for a calendar change; second, that the best proposal for reform is one which will equalize the quarters by having three equal three-month periods of 91 days each and a final three-month quarter of 92 days; third, that when the question of a perpetual calendar is considered, the opinion of the Church should be invited as to the most convenient date for the extra day or days required to fill out the year. In relation to this latter point, it should be noted again that the Catholic Church does not show itself averse to taking up the question of Easter stabilization at an Ecumenical Council.

The practical problems involved in calendar reform cannot be judged from a single angle or viewpoint. There are certain bankers, for instance, who would like a year arranged with mechanical precision for the computation of due dates, payments and interest. There are certain railroad executives, who, looking at the calendar from the standpoint of their own business, would favor a calendar peculiarly adapted to the columns of a railroad timetable, or permitting a greater simplification and regularity of their schedules. There are hotel keepers, too, who think of the calendar solely in terms of their business, and there are merchants handling articles

of fashion who would like a perpetually regulated year solely because it would make their affairs simpler and perhaps more profitable.

These arguments must be dismissed as matters of special pleading. The world is very complex, and the calendar must meet impartially all its complex requirements for time measurement. A new calendar must be examined, not merely from the standpoint of transportation or industry or accounting, but from the broader aspects of religion, economics, social life and history. In other words, it must harmonize all the requirements of a people's life—it must even transcend national boundaries, because the international uniformity of the calendar has come to be so important that even the Greek Orthodox and Mohammedan nations have finally been forced for reasons of economic convenience to adopt the Gregorian system, even though this change has meant a colossal overturning of age-old traditions.

Personally, I am not yet convinced that all the mechanical advantages of a perpetual calendar are capable of being realized, owing to the complicated nature of the minds and opinions which must be reconciled. I place a great deal of importance on the preservation of the week and the quarter. The week is the fulcrum of life for the great mass of people. The quarter is a time division of great convenience and long standing.

BRITISH STATISTICAL ERRORS

By C. David Stelling, Secretary of the Rational Calendar Association, London

BRITISH trade returns for the month of October, which have just been published, illustrate the absurdity of our present irrational calendar. They show a reduction of 24.6 per cent in imports and 7.2 per cent in exports, as compared with the same month of the previous year. Actually, as has been officially explained, these figures do not convey an accurate picture, since October, 1931, had one more working day than October, 1932.

To obtain even approximate accuracy in the study of these statistics requires a complicated mathematical calculation, as a result of which it would appear, for instance, that the real reduction in exports was not 7.2 per cent, but only 3.5 per cent.

In October, 1931, there were 24.5 working days. In October, 1932, only 23.5. November, 1932, has 24, and December 22.5. With the existing calendar no two months are necessarily equal, and therefore no comparative statistics are of any value until the discrepancies, if any, have been ascertained and allowance made for them.

The Rational Calendar Association stands for a removal of the anomalies of the present calendar on simple lines which will equalize the working days in every month without involving the drastic and needless introduction of a 13-month year. Calendar reform is bound to come, because it is rational and in harmony with the spirit of a scientific labor-saving age. Public opinion in Great Britain is rapidly awakening to the desirability of this change and is crystallizing around a demand for a revision which will introduce a perpetual calendar with as little modification as possible in the present system.

FROM AN ANALYST'S STANDPOINT

By HENRY W. BEARCE

U. S. BUREAU OF STANDARDS

Publication approved by the Director of the Bureau of Standards of the U. S. Department of Commerce.

This important contribution to the literature of calendar reform is abridged from an article appearing in the December issue of *The Scientific Monthly*, which is the most authoritative journal of general science published in America. Students of calendar reform who desire the complete article for their permanent files may obtain the magazine containing it by sending 50 cents to the publishers, The Science Press, Grand Central Terminal, New York City.

WITHIN the past few years much has been written on the subject of calendar revision, and many plans have been proposed for revising and simplifying the Gregorian calendar, by means of which most of the civilized world, including the United States, reckons the passage of time and records the order of events.

The matter has been considered by a special committee of the League of Nations, national committees have been organized in the United States and several other countries, and bills have been introduced in Congress, all looking toward a revision of our calendar.

At the October, 1931, meeting of the Committee on Communications and Transit of the League of Nations, at which 44 nations were represented, it was concluded that disturbed conditions rendered the time inopportune for a general simplification of the calendar. Hope was expressed that general action might be taken before the year 1939, that being the first year after 1933 in which the year will begin on Sunday.

If intelligent and well-considered action on the calendar is to be taken before 1939, or at any subsequent time, it is important that a considerable percentage of the people of all nations concerned become somewhat familiar with the more important of the many considerations involved in calendar revision. The day has passed in which calendar revision is likely to be brought about as a result of the efforts or interest of a single individual or even of a small group. Interest must be widespread and efforts well directed to overcome the natural inertia of the public mind and of legislative bodies.

The origin and history of our present (Gregorian) calendar and that of earlier calendars have been so extensively and so ably discussed by others that further treatment of that phase of the subject seems unnecessary. It is perhaps sufficient to say that the Gregorian calendar now in use in the United States and a large part of the rest of the world was adopted in Catholic Countries in 1582; in Great Britain and her colonies, including the

United States, in 1752; in Russia in 1917; and in certain European countries adhering to the Greek Orthodox Church, in 1923.*

The Gregorian calendar is thus seen to have served a considerable proportion of humanity over a relatively long and critical period of time. It would seem wise, therefore, before discarding or materially changing it to consider carefully whether the proposed changes may reasonably be expected to result in definite improvement. The calendar is too vital an instrument to be held lightly, or to be altered for the amusement or even for the benefit of a small group of enthusiasts or reformers.

As a first step in the process of arousing interest in any cause or proposed reform it is usually regarded as good practice to set forth the evils of the existing situation. So in this instance I shall begin by pointing out some of the defects of our present calendar. No attempt will be made to place these defects in the order of their relative importance, as such an arrangement would be largely a matter of personal opinion.

It is my purpose to treat the subject from the standpoint of the analyst rather than from that of the advocate of any particular plan or revision. It is probably inevitable, however, that my personal choice of a plan of revision will be indicated.

The principal defects of our present calendar may be listed as follows:

(1) The calendar year is of non-uniform length; ordinary years containing 365 days, and leap years 366 days.

(2) The calendar year is not evenly divisible into weeks, ordinary years containing 52 weeks and 1 day, and leap year 52 weeks and 2 days.

(3) The calendar year is not divisible, by months, into halves and quarters of uniform length.

(4) The months are of unequal length.

(5) The months are not evenly divisible into weeks.

(6) The date of Easter and other "movable festivals" is not fixed.

The above principal defects are more or less closely interrelated, and out of them flow a wide variety of secondary defects or inconveniences. For example, the first defect comes from the fact that the astronomical or tropical year does not contain an integral number of days. The length of

*In Great Britain and her Colonies the calendar year 1751 ended with December 31, and the year 1752 began on January 1. Prior to that time the British civil year had begun with March 25 (except that in Scotland the civil year, from 1700 to 1751, began on March 1). The year 1751 was, therefore, a short year. Having begun March 25 and ended December 31, it contained no January or February and (except in Scotland) no March 1 to 24, inclusive. 1752 was also a short year in Great Britain and her colonies, since 11 day-dates were dropped from the calendar in September of that year. There were no days designated as September 3 to September 13, inclusive, of that year. There was no interruption of the regular succession of the days of the week. Wednesday, September 2, was followed by Thursday, September 14. 1752 was a leap year under the new calendar, and if 1748 was a leap year under the old calendar, as it appears to have been, then these two leap years were separated by a period of only three years instead of the usual four years. That is, February, 1752, under the new calendar, contained 29 days, whereas, had the old calendar been continued, that month would have fallen in 1751 and would have contained 28 days only. It is thus seen that under the Gregorian calendar each leap year, beginning with 1752, has fallen one year earlier than it would have fallen had the old calendar been continued.

the tropical year being slightly less than $365\frac{1}{4}$ days (365.2422 days, more exactly), it is apparent that if the calendar year is to contain an integral number of days the best that can be done is to make some years contain 365 and others 366 days.

From the second defect, the fact that the calendar year is not evenly divisible into weeks, it follows that successive years begin on different days of the week. For example, 1931 began on Thursday, 1932 on Friday and 1933 on Sunday. The two-day progression between January 1, 1932, and January 1, 1933, comes from the fact that 1932 is a leap year.

This progression of any given date through the various days of the week is the cause of the ever-changing school schedules, vacation periods, etc., and it can be overcome only by some plan that will make all years begin on the same day of the week.

The third defect, *i.e.*, quarters of unequal length, comes from the fact that the months are of unequal length and irregular arrangement. In an ordinary year the quarters are as follows: First quarter, 90 days; second quarter, 91 days; third quarter, 92 days; fourth quarter, 92 days. This gives 181 days to the first half, and 184 days to the second half of the calendar year. In leap year, the first quarter is increased to 91 days and the first half year to 182 days.

The fourth defect, *i.e.*, months of unequal length, is the most obvious, and to many, the most serious defect of our present calendar. In childhood we learned that: "Thirty days hath September, April, June and November," etc., and by resorting to this rather cumbersome device we are able to decide as to the length of the various months. This inequality of the months makes direct comparison of monthly statistics impossible.

The fifth defect, *i.e.*, the month not evenly divisible into weeks (except February of an ordinary year), is also generally recognized as a defect, and this also is regarded by some writers on calendar reform as of great importance. This question will be given further attention later.

The sixth defect, *i.e.*, the wandering of Easter to various dates from March 22 to April 25, both dates inclusive, I shall not discuss in detail, except to say that the date of Easter and other movable church festivals can be fixed under a 12-month or a 13-month plan with equal facility. It is believed that the problem of selecting a suitable date for Easter, under the revised calendar, can safely be left to the properly constituted authorities of the several branches of the Christian Church.

Having pointed out some of the principal defects of our calendar, let us now consider what, if anything, can be done to correct or minimize these defects. In any proposed revision it is important that in our zeal for change we do not simply replace one defect with an equal or greater one. The only justification for changing anything that has served a large sec-

tion of humanity long and satisfactorily is to secure something more satisfactory in its place; and since the function of a calendar is to serve as an accurate and convenient means of reckoning time and recording events, it follows that our only hope of securing a calendar more satisfactory than our present one lies in our ability to devise one that is more accurate or more convenient than the one now in use.

On the basis of accuracy our present calendar, as pointed out by C. F. Marvin, is susceptible of slight improvement.

The passage of time, as indicated by watches and clocks, and by the calendar, is usually expressed in terms of the mean solar day and its subdivisions and multiples, the mean solar day being defined as the average time it takes the earth to make a complete rotation about its axis. As a matter of convenience, the calendar year is made to contain an integral number of mean solar days. It would obviously be inconvenient and confusing to have the calendar year begin at any other time than at the beginning of a day, *i.e.*, at 12 o'clock midnight.

The seasons are, of course, governed by the position of the earth with reference to the sun, and the tropical year is defined as the time it takes the earth to make a complete journey around the sun. This period is not divisible into an integral number of mean solar days. That is, in the time required by the earth to make a complete journey around the sun, the earth does not make an integral number of complete rotations about its own axis. This incommensurability of the tropical year and the mean solar day is the cause of much of the difficulty in calendar-making.

The present length of the tropical year is 365.24220 days, and the year is growing shorter at the rate of 0.53 second per century.

Since the calendar year contains sometimes 365 and sometimes 366 days, the average length is, of course, determined by the relative frequency of occurrence of these two numbers, that is, by the leap-year rule.

Under the Gregorian leap-year rule every fourth year is a leap year, except that of the century years only those years that are evenly divisible by 400 are leap years. That is, in a period of 400 years, 3 years that would normally be leap years, under the 4-year rule, are not counted as leap years. The calendar year is longer than the tropical year at the present time by 0.0003 day, or 25.92 seconds. Moreover, if the tropical year is shortening and if it continues to shorten, this difference will increase as time goes on and in the course of some 3,300 years from the time when the two were in agreement an error of a full day will have accumulated as a result of this increasing difference between tropical year and Gregorian calendar year.

Because of this error in the average length of the Gregorian calendar year, as compared with the present length of the tropical year, it has been suggested by Marvin that in revising our calendar we should at the same time adopt a more nearly correct leap-year rule. A more nearly correct

rule has, in fact, already been tentatively put into effect by the Greek Orthodox Church, which in its adoption of the Gregorian calendar did not adopt the Gregorian leap-year rule, but in its stead, a more accurate one under which in a period of 900 years, 7 quadrennial years that would normally be leap years are not counted as leap years.

With further reference to the supposed necessity for adopting a more exact leap-year rule, it should, perhaps, be pointed out that this may be regarded by some as a case of "straining at a gnat and swallowing a camel," since even with a perfect leap-year rule the calendar and the tropical year are bound to be "out of step" by at least $\frac{1}{2}$ day once in each 4-year period. For example, if the calendar year and the tropical year are "in step," that is, begin at the same time, at the beginning of a 4-year period, they will be "out of step" by $\frac{1}{4}$ day at the end of the first year, $\frac{1}{2}$ day at the end of the second year, $\frac{3}{4}$ day (or $\frac{1}{4}$ day in the opposite direction) at the end of the third year, and again "in step" at the end of the fourth year. It may, therefore, be unwise to be troubled overmuch by a cumulative error of one day in about 3,300 years. It might be just as satisfactory to correct the Gregorian leap-year rule by simply dropping out an extra leap year once in each 3,300 years. The discrepancy already accumulated could be corrected by counting as an ordinary year some year, say 1940, that would normally be a leap year.

Let us now turn to the second ground on which revision of our present calendar may properly be urged; that is, increased convenience.

The principal defects of the Gregorian calendar having already been pointed out, attention will now be given to means by which these defects may, in whole or in part, be overcome.

The many plans of revision that have been proposed, while differing in detail, are nearly all reducible to two general plans; first, the 13 equal months plan, and second, the 12 month, equal quarters plan.

The ideal arrangement would, of course, be a calendar year of 12 months, of 28 days each, since it would provide a complete and consistent series of time units, from the second to the year, with each unit containing an integral number of the next smaller unit.

The only difficulty with this plan is that it wouldn't work. Such a calendar year would be about 4 weeks shorter than the tropical year, and as a result, within a very few years, the 4th of July would come in the winter, and Christmas in the summer. There would be no fixed relation between calendar and seasons. Such a calendar would not be at all satisfactory.

We must, then, content ourselves with some plan that will keep the calendar year as nearly as practicable equal to the tropical year, and at the same time be as convenient as possible.

We are, therefore inevitably driven back upon one or the other of the

two plans already mentioned; namely, the 13 equal months plan, or the 12 month, equal quarters plan. The practical problem is to decide which of these two plans will result in the greatest net gain.

It has already been shown that the tropical year contains about $365\frac{1}{4}$ days, and that by the adoption of a suitable leap-year rule the average length of the calendar year can be made equal to that of the tropical year to any desired degree of approximation. Since it is important to have the beginning of the calendar year coincide with the beginning of a day, that is, to have the calendar year contain an integral number of complete days, it is obviously necessary to have some years contain 365 and others 366 days. In this respect there is no possibility of improvement through calendar revision, since the length of the tropical year and of the mean solar day are beyond the control of man. If they are "defective," from our point of view, it is unfortunate; there is nothing we can do about it.

The second defect of our calendar, that is, that the calendar year is not evenly divisible into weeks without a remainder, is the result of the simple mathematical fact that neither 365 nor 366 is evenly divisible by 7. There is a remainder of 1 day in ordinary years and 2 days in leap years, as already pointed out, and this excess of 1 day or 2 days is what causes the progression of any given date to various days of the week. The only way it can be overcome is by resorting to some device or subterfuge by means of which one week in each ordinary year and two separate weeks in each leap year are made to contain eight 24-hour periods each instead of the usual seven 24-hour periods. A wide variety of plans have been proposed for accomplishing this; "blank days," "double days," "days without date," etc. The usual suggestion is that these 48-hour periods be placed at the end of December each year, and at the end of June in each leap year.

The method of designating the second 24-hour period of these suggested 48-hour "days" is not important, except that the designation must be definite and specific. They cannot be "blank days" or "days without date," since events will occur, persons will be born, others will be married, still others will die during these 24-hour periods, as in any other similar period, and records must be as specific and definite as for any normal day. A satisfactory designation would seem to be "Sat. Dec. 31," this day to follow "Sat. Dec. 30," each year; and "Sat. June 31," to follow "Sat. June 30" of each leap year.

Obviously such a device would make the calendar year evenly divisible into weeks, with no remainder, and all years would then begin on the same day of the week.

If such a change should be put into effect at the appropriate time, say 1933 or 1939, all subsequent years would begin on Sunday and end on Saturday. Such a change would apply equally well to a 13 equal months calendar or to a 12 month, equal quarters calendar, as outlined below.

Objection has been raised by certain religious groups, notably Jews, Seventh Day Baptists and Seventh Day Adventists, to the adoption of any plan of revision that will interrupt the regular succession of the 7 days of the week. From the foregoing it is apparent that if a revision plan is to be adopted such that all years will begin on the same day of the week, whether it be a 12-month or a 13-month plan, this objection, if it be an objection, will have to be tolerated.

The principle of the 48-hour period under a single day name is by no means new. At the time of Moses there were double days at the feast of the Passover. At the present time there is an almost exact analogy in the reckoning of time at the international date-line. When this line is crossed from west to east a second 24-hour period is given the same day-name (and date) as the 24-hour period just passed; that is, a day is repeated. On crossing the line in the opposite direction a calendar day is omitted. When a traveler from east to west passes from one standard time zone into the next he sets his watch back an hour and thus has two one-hour intervals in the period of one hour by his watch. These variations from the regular progress of time are not usually regarded as sacrilegious or in violation of divine law. They are regarded, rather as convenient methods of bringing about standardization in the reckoning of time. It would seem that the proposed "double-day" might reasonably be regarded in the same light.

So far, then, there is no choice between the two proposed plans. With the third defect, we come to the parting of the ways, since what applies to one plan will not apply to the other. We must, therefore, decide which characteristics of a calendar are to be regarded as most important. For example, is it more important that all months be alike and each month evenly divisible into weeks, even though this arrangement makes necessary the addition of a new month; or is it more important to retain the 12-month calendar, to which we are accustomed, making the quarters equal, and the months as nearly equal as is possible under a 12-month plan?

Under the 13 equal months plan each month would contain 28 days, or 4 complete weeks, and all months would begin on Sunday. The calendar for all months would be as follows:

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

Under this plan a new 28-day month would have to be added at some point in the calendar. One suggestion is that it be inserted between June

and July and that it be designated "Sol," as the summer solstice would fall within this period.

The most satisfactory arrangement for a 12 month, equal quarters plan, is undoubtedly that in which each quarter contains one month of 31 days followed by two months of 30 days each. This is often referred to as the "World Calendar." The arrangement is shown below:

January	February	March
April	May	June
July	August	September
October	November	December
Su M Tu W Th F Sa	Su M Tu W Th F Sa	Su M Tu W Th F Sa
1 2 3 4 5 6 7		
8 9 10 11 12 13 14	5 6 7 8 9 10 11	3 4 5 6 7 8 9
15 16 17 18 19 20 21	12 13 14 15 16 17 18	10 11 12 13 14 15 16
22 23 24 25 26 27 28	19 20 21 22 23 24 25	17 18 19 20 21 22 23
29 30 31	26 27 28 29 30	24 25 26 27 28 29 30

It will be seen that the first month of each quarter, *i.e.*, January, April, July and October, begins on Sunday, contains 31 days with 5 Sundays and 26 week days, and ends on Tuesday; that the second month of each quarter, *i.e.*, February, May, August and November, begins on Wednesday, contains 30 days with 4 Sundays and 26 week days, and ends on Thursday; that the third or last month of each quarter, *i.e.*, March, June, September and December, contains 30 days with 4 Sundays and 26 week days, and ends on Saturday.

Under this plan the four quarters would be equal, the two halves would be equal, corresponding months of each quarter and of all years would be equal, and for many industrial purposes all months would be equal, since each month would contain 26 week days. For certain other purposes the months would not be equal, since some would contain 30 and others 31 days.

Advocates of the 13-month plan lay great stress upon the importance of having all months of equal length, in order that for statistical purposes they may be directly comparable. It might be well to inquire whether making them the same length would in fact make them comparable. Obviously, because of seasonal variations, comparisons between December and June, for example, will, in many cases, be of little value, even though each month be made to contain 28 days. In many cases monthly statistical comparisons are valid only between corresponding months, for example, June with June, December with December, etc. Such comparisons are as convenient under the 12-month plan as under any 13-month plan.

In general, statistical comparisons are made between periods recently closed and corresponding periods of former years. It is important, therefore, that current statistics be kept in terms of time intervals that have as nearly as possible exact counterparts in former years. For example, statistical comparisons can be made between August, 1931, and August of

any other year without serious error. If correction is necessary in order to take account of the differences of industrial or business value of the different days of the week, this correction can readily be made. That is, if our calendar is revised on the basis of a 12-month, equal quarters plan, comparison of statistics for any month under the new plan, with those for the corresponding month under our present calendar, would not be seriously interfered with. Direct comparison of unreduced monthly figures for corresponding months would in many cases be satisfactorily accurate, and after the lapse of a few years, so that comparisons were entirely within the new calendar, they would be entirely accurate.

On the other hand, what would be the situation if we should adopt the 13-month plan? Corresponding months under the new calendar would, of course, be comparable; but what of comparisons between the new 28-day calendar months and corresponding periods of the past? Obviously, figures would not be available for corresponding periods of the past. How, then, could comparisons be made? The answer is that they could not be made without so many adjustments, approximations and assumptions that the comparative figures, when finally arrived at, would be of little value.

The case against the 13-month calendar from the statistical standpoint is well presented by Professor Clark Warburton in the closing paragraphs of his article in the August, 1931, number of the *Journal of Calendar Reform*:

To re-compute the numerous indexes of prices, industrial production and other phases of economic activity would be a costly procedure justified only by definite and great advantages. In the case of many of the statistical series linking the present with the past, it would be impossible to convert the records of the past into a form comparable with the present.

The next few years are certain to be critical years in the world's history. Economic changes are extremely rapid. Economic systems are challenging each other. There is great uncertainty. Popular clamor has begun for economic stabilization, for reform of the capitalist system so as to provide continuous and adequate incomes for wage-earners, and for the future development of productive facilities in accord with a national plan based on the needs and desires of the people.

To meet this demand for business stabilization and for national economic planning it is essential that economists and business men have during the next few years all the aid possible from past business records. A radical change in the calendar would seriously reduce the usefulness of these records and thus hamper the adjustment of business to world needs at a critical time in the advance of civilization.

Another defect of our present calendar that is regarded by advocates of the 13-month plan as particularly serious is the fact that the month is not evenly divisible into weeks, so that, in general, the end of the month does not coincide with the end of the week. That this is a defect can hardly be questioned. It may, however, be questioned whether the defect can be overcome without at the same time introducing a still greater defect. If the remedy is worse than the disease, we might well prefer the disease.

Under our present calendar the year consists of 52 weeks plus 1 day or plus 2 days, depending on whether it is an ordinary year or a leap year. As already pointed out it can be made to contain 52 weeks, with no remainder, by including one 48-hour period under a single day name in each ordinary year, and two such 48-hour periods, each under a single day name in each leap year.

The 52 weeks, or 364 days, may then be divided into months of whatever length is found most convenient. Under a 12-month plan the months cannot be of equal length, since 364 is not evenly divisible by 12. The best that can be done is to have 8 months of 30 days each, and 4 months of 31 days each. The most satisfactory arrangement of these months, as already pointed out, is to have each quarter of the year contain one 31-day month, followed by two months of 30 days each. Under this plan the end of the month will coincide with the end of the week only at the end of each quarter; that is, at the end of each 13-week period.

The months can be made equal and at the same time each month made to contain an integral number of weeks, with no remainder, only by dividing the year of 52 weeks into months of 2, 4, 13 or 26 weeks each, since these are the only factors of the number 52. Of these possible divisions, the only one that results in months approximating in length those of our present calendar is that of 13 months of 4 weeks, or 28 days, each.

At first sight this seems like a reasonably satisfactory arrangement, and it no doubt would be if we were accustomed to it. The principal objections to it are (a) that it is too radical a departure from our present calendar to be readily accepted by the public; (b) that 13, being a prime number, cannot be divided into sixths, quarters, thirds and halves, as can our present calendar year of 12 months. This would necessitate an extra closing of all books and accounts for business conducted on a quarterly or semi-annual basis, since the ends of the first, second and third quarters would in no case correspond with the end of a month; (c) for statistical purposes the 28-day month would differ too much from our present calendar months, both in length and in seasonal position, to admit of accurate comparison with our present months; (d) the 13-month calendar would require an extra monthly closing of all accounts, reading of meters, sending out of bills, etc., and would thus add 1/12 to the clerical, postage and other such costs of doing business. (This is in addition to the cost of the extra quarterly and semi-annual closings already referred to.)

What advantages, if any, would accrue to offset these obvious disadvantages of the proposed 13-month calendar? There are two, and only two, that cannot be attained equally well under a properly revised 12-month calendar. These are (a) the months would be made equal in length, and (b) the end of each month would coincide with the end of the week; *i.e.*, each month would contain an integral number of complete weeks.

But even these supposed advantages of the 13-month calendar are open to question. Even though all months be made of equal length they will still not be strictly comparable for many statistical purposes because of the number and distribution of holidays and because of seasonal variations. For example, a 28-day month without a holiday cannot be said to be directly comparable, for industrial or business purposes, with a 28-day month having one or more holidays or with a 28-day month at some other season of the year. If an equalization, or reduction to the same basis, has to be made, even in the case of 28-day months, what, then, is the advantage of the 28-day month? It is no more difficult to equalize two months of 26 and 25 working days than to equalize two months of 24 and 23 working days, and in those cases in which equalization is not required, comparisons between two months of 26 working days would be as valid and as satisfactory as between months of 24 working days.

In the case of statistics of natural phenomena, such as rainfall, accumulated excess of temperature, etc., there would, of course, be an advantage in having all months of equal length.

Again, is it in reality important that the month be evenly divisible into weeks, so that the end of the month will in all cases coincide with the end of the week? Business may be conducted on a daily, weekly, monthly, quarterly, semi-annual or annual basis. The important consideration is that each unit of time be definite.

The same situation obtains with reference to units of quantity. We purchase some materials by gallon, others by cubic foot and still others by pound. There is no more necessity that months contain an integral number of weeks than that cubic feet contain an integral number of gallons.

Employees are usually paid by the day, by the week or by the month, and each employee can usually adjust his financial program in such a way that income and outgo are properly balanced. Such difficulties as occur usually arise from the fact that the income is inadequate in amount rather than from the fact that the period of income is not exactly synchronized with the period of expenditure. In fact, it would appear that these two periods could be completely and exactly synchronized only by putting each individual, firm and corporation on a financial schedule similar to that of the average small boy, who, when he gets a nickel, spends a nickel; when he gets a dime, spends a dime; and when he gets a dollar, spends a dollar. The general adoption of such a schedule would no doubt bring the period of earning and the period of spending into complete harmony, but, surely, making the end of the month coincide with the end of the week would have no marked influence in the matter. We should still continue to receive our income by the day, week, month, quarter or year, and to spend it in a manner highly irregular as to time.

Advocates of the 13-month plan of revision emphasize the importance

of the 4-week period as a time unit for business purposes. If the 4-week period does, in fact, possess the advantages claimed for it, there would seem to be no reason why it should not be used for that purpose, by those who prefer it, without in any way interfering with the use of the 12-month, equal quarters calendar for other purposes or for all purposes, by those who prefer it.

SUMMARY

The Gregorian calendar is susceptible of improvement as follows:

(1) All years can be made to begin on the same day of the week. This can be accomplished equally well under a 12-month or a 13-month plan.

(2) A slightly more accurate leap-year rule than that now in use can be adopted if desired. There is some doubt as to the need for a more exact rule. If adopted it would apply equally well to a 12-month or to a 13-month plan.

(3) Under a 12-month plan the quarters of the year can be made equal by a slight adjustment of the lengths of certain months of the Gregorian calendar.

(4) The months can be made equal for many industrial purposes, and corresponding months can be made equal and comparable for all purposes, under a 12-month, equal quarters plan.

(5) All months can be made equal by the adoption of a 13-month plan.

(6) Each month can be made to contain an integral number of weeks by the adoption of a 13-month plan.

(7) The date of Easter and other movable church festivals can be fixed equally well under a 12-month or a 13-month plan of revision.

(8) The 4-week period can be used for business purposes, by those who prefer it, without interfering with the 12-month calendar.

STATISTICAL VALUES

By Ogden L. Mills, Secretary of the Treasury

(In an Interview Published by the "Wheeling Register")

IF THERE is any hope of maintaining balanced conditions in industry and trade, in contrast with the haphazard adjustments upon which we have relied in the past, that hope lies in the gathering of accurate information. But more than this, it lies in the careful analysis of this information, the establishment of fundamental principles on the part of the people themselves. This last is essential, so that if we are lucky enough to have leaders endowed with wisdom and foresight, the people will have the necessary knowledge to back them up.

We have made great progress in the gathering of current business statistics. This information can so readily, rapidly and widely spread that the business course of the future can be charted by the light of this information. All this will naturally result in greater safety to individual industries and give some assurance of stability to our economic life.

FROM THE MAILBAG

The subject is a live one today. Catholic scholars are giving much thought to it in the hope that the calendar will be improved. Best wishes.—Morgan M. Sheedy, Catholic Priest, Altoona, Pa.

We favor the twelve month plan as outlined by your association and will be pleased to lend such aid as may be possible in promoting the success which is sure to come as a result of your efforts.—Major Joseph Caccavajo, Editor, North Jersey Times, Mountain View, N. J.

The adoption of The World Calendar will greatly simplify the advertising and merchandising problems of today. I hope for a speedy revision of our present calendar along the lines you are now working.—W. H. Davis, Asheville, N. C.

I have been confused and annoyed by the thought of calendar change. Yet I have seen the need for it. The World Calendar plan is so simple and yet intelligent that I hasten to endorse it. It clarifies this subject! I hope it will be adopted.—Charles S. Walton, Jr., Philadelphia, Pa.

I am very much interested in the calendar reform movement, but I cannot approve the plan of 13 months. By all means retain 12 months in the year. A permanent calendar would surely simplify matters. The movable feasts create the biggest puzzles. The annual Directory would become a permanent one.—Rudolph Bonner, Catholic Priest, Cincinnati, Ohio.

A change such as is contemplated will require education and sympathetic cooperation.—C. W. Longman, Chicago, Ill.

For years the reform of the Calendar has appealed to me as a most desirable step to take. May the Journal help a lot!—Wm. Channing Brown, Clergyman, Littleton, Mass.

The best solution yet of the calendar problem.—Charlotte L. Williams, West Bridgewater, Mass.

The proposed 12-month revision of the calendar is very much more practical and better than the proposed 13-month year. The 26 week days in each month is desirable, as is also your proposed simplification.—A. M. Darlow, Wellsville, N. Y.

I once voted in favor of the Eastman plan, at a meeting of the American Academy of Arts and Sciences in Boston a year or two ago; but I am completely won over by your arguments in favor of The World Calendar of 12 months.—Edward V. Huntington, Professor in Harvard University, Cambridge, Mass.

Your plan is surely a wonderful plan. It would save us on our advertising to always have opening dates permanent.—J. H. Cox, Galesburg, Ill.

A needed, workable, possible plan. Count on me to boost every opportunity I have.—George N. Mendenhall, Professor in Midland College, Freemont, Nebr.

I favored the 13 month calendar but this offers some advantages. I like it. It leaves 12 months. Holidays come at the week-end. Leaves our accounting methods intact, and simplifies the old calendar.—H. O. Warren, Troy, N. Y.

Modern times demand a calendar revision. I heartily endorse the 12-month reformed calendar.—C. S. White, Principal, Pratt School, New York City.

Our present age demands a readjustment in the division of time due to working and business conditions. This equalization will certainly solve many problems both locally and internationally.—A. C. Hermann, Professor, Commercial College, Charleston, W. Va.

The World 12-Month Calendar seems to me to be the ideal solution.—H. V. Fall, Nashville, Tenn.

I thank you for Calendar Reform material. The 12-month plan should by all means early be made operative. It's great! Push it along!—E. F. Enevemyer, Los Angeles, Calif.

Your Journal of Calendar Reform interested me greatly as I had believed the 13-month plan the one deserving support. Your arguments are weighty and suggest the importance of careful consideration in correcting the errors in our calendar.—Walter L. Bennett, Lowville, N. Y.

I am delighted to see so able a presentation of the only plan which preserves the basic characteristics of a system of dividing up the so-nearly undividable year.—Edward H. Davis, Waterbury, Conn.

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EDITORS

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CARL LIDDLE

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OFFICIAL American interest in calendar reform has shown a steady growth during the past year. In Washington and in state capitols, attention to calendar revision is noted as one of the economic adjustments required in the task of recovery after depression. On this basis, in fact, it is proposed to take up the subject for consideration at the next conference of Governors in the spring of 1933. On the same basis, the New York State Chamber of Commerce is undertaking a formal study in committee, which may result in legislative recommendations.

The pronouncements of the past year by Admiral Upham, Chief of the Bureau of Navigation, by Admiral Moffett of the Bureau of Aeronautics, and by Governor Moore of New Jersey, are supplemented in this issue of the JOURNAL by notable articles from Henry W. Bearce, Bureau of Standards, and from Herbert H. Rapp, formerly of the Bureau of Efficiency.

The attitude of official America resembles that taken by Germany at the League of Nations. "It is the present economic crisis," declared the German delegate, "which seems to us the most urgent argument for breaking away from old institutions created for other periods and operating to hamper and injure modern economic activity. This is the reason why the great majority of organizations consulted by the German Government have pronounced themselves in favor of calendar reform. It is a reason which the German Government has made its own, and supports emphatically."

Governor Moore of New Jersey has recommended an official study of calendar reform. Mr. Rapp believes that a detailed analysis of government statistics should be undertaken, for obtaining definite and accurate information as to economic loss involved in present calendar irregularities, and economic gain to be derived from conservative revision. Mr. Bearce calls attention to the need for a larger body of informed public opinion "to overcome the inertia of the public mind and of legislative bodies." Admiral Upham, having referred the proposals of The World Calendar Association to the personnel of the U. S. Naval Observatory, has reported that "their comments are entirely favorable and they recommend its adoption." Admiral Moffett points out that "the real leaders see the importance of calendar reform, and visualize a revised calendar as inevitable."

EXCERPTS AND REVIEWS

Official French Opinion

By ANDRE BERTAUT

President of the Bureau of Transportation of the Paris Chamber of Commerce

(From a Report Presented by the Minister of Foreign Affairs to the French National Economic Council)

FILLED with a desire to realize the best possible adaptation of man to the universe, our modern age seeks in every way to set in operation improvements which will increase the logical arrangement of life. The science of economics, which was a purely theoretical study until comparatively recent times, has proved to us the necessity of creating a harmonious coordination between all the factors, human and natural, which combine to achieve the general wellbeing of the race.

Today there is no longer any question of the desirability of "rationalizing," of "simplifying," of making practical every detail which opposes the incessant march of progress. But how can mankind hope to achieve the desired end so long as the very basis of their time measurement, by which they record the past and chart the future—namely, the calendar, is a perpetual example of variability, uncertainty and bad logic, which necessarily gives to all existence a tinge of its own irrationality and complexity?

Is it not time to remedy this state of things and to substitute some method of counting time which is more accurate and reasonable? Such is the question which has now come to the front, and which it appears necessary to study painstakingly, because the need of this reform seems today to be felt throughout the world.

Historical study of the Gregorian calendar reveals that the "scientific bases" of the calendar are not particularly important in our present system, inasmuch as the only really scientific factor is the exact calculation of the length of the year. All the other calendar divisions are purely empirical, and have been imposed through motives often religious or superstitious, but certainly not of a kind which justifies mankind in continuing these anomalies forever. The particular irregularities which give rise to the most difficulties come from the varying length of months and

quarters, and from the lack of accord between the days of the week and the days of the month in successive years.

Until recent times, these anomalies were not particularly important in human life. They were noted as scientific facts, but they did not have sufficient influence on the general welfare to require correction.

With the new era in which we live we must find a method of computing time which, while keeping as closely as possible to the measures used in the past, and also to the scientific and astronomical facts, will also respond to the modern need for accuracy and efficiency. The present calendar is far from perfect, for it does not provide business and private life with the simplicity and stability which is an increasing necessity.

Industrial Viewpoints

(Extract from *Furniture World and Furniture Buyer and Decorator*, January, 1932)

WHEREVER industry meets, especially where that industry's scope has reached national or international proportions, the subject of calendar reform always appears.

Supporters of the reform movement contend that stabilization of the calendar throughout the world, making it perpetual—the first of January always falling on a Sunday, etc.—will make all forms of business records simpler, more readily understood; will make yearly comparisons more valuable because of the uniformity of the business period; will help to put competition on a finer basis, for one group will not be working while another is celebrating a holiday, etc.

Each of us, of course, has the right to draw our own conclusions as to the workability of the proposed thirteen-month calendar, with 28 days in each month, and the proposed World Calendar. One thing is certain, however, that the changes and improvements proposed by the latter form would not call for so great a change in our industrial system, especially where operating costs are figured on a quarterly or semi-annual basis at the present time; where salaries are figured on a yearly basis, etc.

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